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FIRST USSR CONFERENCE ON PHYTONCIDES

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The first conference on phytoncides was held at Leningrad in 1954.

The discovery of the existence of phytoncides by B. P. Tokin, a professor at Leningrad University, induced USSR specialists in various fields to subject to study this class of substances. The discovery of phytoncides and of phenomena pertaining to their activity has also attracted much attention on the part of foreign scientists. More than 300 persons participated in the conference. Among them were biologists, microbiologists, plant physiologists, biochemists, phytopathologists, physicians, and other specialists from 35 cities of the Soviet Union.

Professor Tokin presented a report entitled "The Phenomenon [of the Existence] of Phytoncides as an Ecological and Evolutionary Problem." In this report the theoretical aspects of the biological activity of phytoncides in nature were subjected to discussion. Phytoncides are a factor which has a bearing on the immunity of plants and on the persistence of biocenoses encountered in nature. The evolution by lower plants of substances of the penicillin type, which are commonly designated as antibiotics, is merely a special case of the phenomenon of occurrence of phytoncides and their evolution by plants.

Prof P. N. Kashkin (Leningrad) in a report entitled "Microbiological Parallels in the Investigation of Antibiotics and Phytoncides" outlined the ways to be followed in further work on the purification and concentration of phytoncide preparations. A number of papers, e.g., those by B. S. Drabkin (Chkalov) and B. G. Gramenitskaya (Leningrad), dealt with the connection between the production of phytoncides by plants and the vital activity of these plants.

In a report by Docent S. S. Skvortsov (Leningrad) proofs were presented that a connection exists between the formation of phytoncides and photosynthesis. The phytoncide activity in different parts of plants varies with the season. At different stages of the development of plants, the amount of phytoncides formed by the plants is different.

Under various physiological conditions of the plants, a different rate of the formation of phytoncides is observed in healthy plants as distinguished from diseased plants (V. G. Gramenitskaya).

Many reports presented at the conference were devoted to the dependence of the formation of phytoncides by plants on the time of the day, weather, temperature, humidity, and other factors, and also to the search for new plants the phytoncides of which can be used in medicine. The authors of these reports were A. Ye. Zimin (Samarkand), Prof P. P. Snegirev (Nikitskiy Botanical Garden, Crimea), Prof I. K. Dagis (Vil'nyus), and others.

Prof F. V. Khetagurova presented a programmatic report entitled "Ways for the Investigation and Application of Phytoncides in the Cultivation of Plants." In addition to other problems she dwelt on the elimination of phytoncides by subterranean parts of plants, regulation of vital activities of the soil microflora, enhancement of the immunobiological resistance of plants, problems of crop rotation, etc.

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V. A. Solov'yev (Molotov) presented data on the effects which plants exert on each other at a distance and the effect which volatile phytoncides have on the germination of pollen. As a result of experiments in which germination of alfalfa pollen was induced under artificial conditions, Solov'yev arrived at the conclusion that the phytoncides of agropyrum and of oats have a stimulating effect on the germination of this pollen. On the other hand, the volatile phytoncides of the bird cherry, acacias, timothy grass, and some kinds of wormwood were found to exert a depressing effect on alfalfa pollen. Solov'yev assumes that the effectiveness of Michurin's method of pollination with pollen mixtures is due to the stimulating effect exerted by the germinating pollen derived from plants which have been included in the mixture.

Many reports dealt with the chemistry of phytoncides. Extensive investigations on the subject have been carried out by the personnel of the Institute of Microbiology at Kiev under the direction Prof V. G. Drobot'ko, Active Member of the Academy of Sciences Ukrainian SSR. The phytoncide activity exhibited by essential oils, resins, balsams, organic acids, quinoids, tannins, compounds containing a lactone ring, alkaloids, glucosides, saponins, and other classes of compounds has been investigated.

Prof P. A. Yakimov (Leningrad) gave a programmatic report dealing with problems of the biochemistry of phytoncides. In this report information on the phytoncide activity of balsams and resins was stressed.

N. V. Novotel'nov (Leningrad) presented a paper dealing with the phytoncidal characteristics of the flavone glucosides of sweetbrier fruits.

K. L. Stukkey (Leningrad) investigated the interrelationship between ethereal oils and phytoncides in plants which produce ethereal oils. She was able to establish that the volatile phytoncides of the black currant and the ethereal oil of this plant are different substances.

The conference demonstrated that the scope of microbiological investigations has been considerably extended: the bactericidal properties of more than 3000 plants have been investigated.

A number of papers presented at the conference were devoted to problems pertaining to the range of the antibacterial activity exerted by phytoncides and to the specificity of their action. While some bacteria perish under the action of phytoncides, others change their properties, i.e., the properties of pigment formation and virulence. Under the action of phytoncides, *Staphylococcus aureus* is changed into a virulent form of *Staphylococcus albus*. A freshly isolated strain of dysentery bacilli is more sensitive to the phytoncides of the same plant than a laboratory strain which has been cultured on an artificial medium for a long time.

Work by V. G. Gramenitskaya (Leningrad) on the utilization of phytoncides in the cultivation of plants was reviewed at the meeting. Gramenitskaya has demonstrated that the treatment of cottonseed with phytoncides prior to planting not only disinfects the seed, but also increases the percentage of plants which germinate and raises the energy of sprouting.

A report entitled "The Application of Phytoncides in Animal Husbandry and in Veterinary Medicine" was presented by V. V. Poltev (Leningrad). Volatile phytoncides have been extensively applied at apiaries for the treatment of many diseases of bees and also for the treatment of diseased silkworms. Poltev also discussed problems pertaining to the suppression of the activity of putrefaction bacteria and of lactic acid bacteria in silos.

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Many papers dealt with medical applications. A report entitled "Phytoncides and the So-Called Popular Medicine" was presented by Professor Gammerman (Leningrad). She discussed Chinese, Russian, and other popular medicines, which have made use of the phytoncidal properties of plants on a purely empirical basis.

Prof P. A. Yakimov recommended that methods whereby the phytoncidal and ozonizing properties of the oleoresins of conifer needles are utilized be applied on an extensive scale for the effective purification of the air at schools, industrial plants, hospitals, theaters, and clubs. He pointed out that some birds, e. g., woodgrouse and crossbills, are exposed to the action of oleoresin balsams under natural conditions.

Prof T. D. Yanovich (Tomsk) established that the air of pine and cedar forests contains a minimum quantity of bacteria irrespective of the latitude or the relative proximity of populated localities.

A. M. Dumova (Chkalov) has shown that a number of potted plants grown indoors, such as Pelargonium roseum, Pelargonium zonale, and Chrysanthemum indicum, may partially sterilize the air. In connection with the problem of the planting of trees and gardens in cities, P. I. Bryntsov (Moscow) investigated the phytoncidal activity of the tree species which grow in the forests and parks composing the "green belt" of the city of Moscow. It was discovered in the course of this work that birches, maples, oaks, hazelnut trees, willows, and other trees release huge quantities of volatile phytoncides into the environment. Prof S. I. Vinokurov and others have subjected to investigation the effects exerted by phytoncides on the physiological and chemical processes taking place in nerve tissue. M. M. Epshteyn (Kiev) has developed a refractometric method for the detection and determination of very small quantities of phytoncides in the air. The application of an interferometer has made it possible to discover a number of phytoncides under natural conditions by observing the changes in the air refraction index produced by them. It has been established that concentrations of pine phytoncides which are encountered under natural conditions exert a considerable effect on the enzymatic processes taking place in nerve tissue and on the changes to which bioelectric phenomena that occur in peripheral nerves are subjected.

Groups of clinicians at Samarkand (Professor Shevchenko, A. N. Kazakova, L. A. Klimenko), Riga (M. P. Ruskan), Leningrad (Prof P. K. Bulatov, S. Ya. Khloponina, et al), Tbilisi (A. M. Kazancheva), and Saratov (Prof A. M. Foy) established that phytoncides are effective in the therapy of nonspecific pulmonary abscesses and used them in the surgery of abscesses and in the treatment of gastrointestinal and other diseases. V. Ya. Rodina and V. P. Korotkova (Leningrad) used some phytoncides successfully in the therapy of experimental influenza. A communication on the fight with the carrying of diphtheria bacilli by children was made by Physician N. V. Kaminskiy (Tomsk). The first USSR cabinet for combating by means of phytoncides of coniferous plants the carrying of diphtheria bacilli has been opened at Tomsk.

Work on the use of phytoncides in the food industry was also reported at the conference. The results of investigations by A. I. Rogachevskiy (Moscow) have made it possible to reduce by 50 percent the time during which vegetable preserves must be subjected to the action of heat. As a result, the color, aroma, texture, and vitamin content of the vegetables being preserved are affected to a considerably smaller extent. N. V. Novotel'nov (Leningrad) established that products of the enzymatic splitting of the flavone glucosides of sweetbrier exhibit phytoncide activity. He developed a method for the isolation of these products in a crystalline state. The fact that there is a synergism between the action of the products of enzymatic splitting and that of ascorbic acid has also been established: ascorbic

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acid reinforces the phytoncide activity of the aglucone fraction derived from the flavone glucosides. Prof V. G. Speranskiy and his collaborators (Moscow) achieved with the aid of phytoncides preservation of fruits and vegetables from spoiling.

About 100 papers were presented at the conference. A scientific motion picture entitled "Phytoncides" was shown during the meeting. While the conference demonstrated that a considerable amount of work on the subject of phytoncides has been done in various fields of science, the conclusion could still be drawn that practical applications of this class of substances are in the earliest stage of development.

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